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The path to presence in performance through movement, physiological response, and mood

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Abstract: Presence may occur when actors are alert and relaxed in performance. A positive mood is associated with physical activity, but little is known about how movement qualities affect mood and vital signs of actors. This study examined the effects of vibratory, pendular, abrupt, and sustained movement qualities on the Brief Mood Introspection Scale, and physiology. Undergraduate theatre (n = 25) and non-theatre majors (n = 24) engaged in protocols of four movement qualities: vibratory, pendular, abrupt and sustained. Mood and heart rate, blood pressure, respiration rate, and temperature were measured before and after four different movement protocols. The hypothesis that the sequence of vibratory, pendular, sustained, and abrupt increased the alert, relaxed state of Presence and Arousal was rejected. It was found that systolic blood pressure increased in men across protocols. A significant interaction was found between the participants' major and "Tired." Because Tired and Arousal indicate mental and/or physical energy, a relationship between MAJOR and "Tired," combined with significant correlation between subjects and major, suggests that the protocols resulted in fatigue. Half of the mood variance is explained by the factor "major." These two significant findings suggest a relationship between mood and major as well as blood pressure and gender.

Subjects: Arts & Humanities; Medicine; Social Sciences; Theatre & Performance Studies; Drama

Keywords: performance; mood; exercise; physiology; presence; actor training; movement

ABOUT THE AUTHORS

Artemis Preeshl teaches acting, movement, and speech. She conducts research on personality, mood, and movement. A Fulbright Senior Researcher, she directed Pancha Ratna (Best World Cinema, Hollywood's DIY Film Festival). The Globe selected her as an International Actor Fellow. The Routledge Companion on Commedia dell'arte published her chapter on Brighella. She completed her MA degree in Dance, BA degree in Psychology, and is a Laban Movement Analyst. She is an associate teacher of Fitzmaurice Voicework®.

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PUBLIC INTEREST STATEMENT

In American theatre, an engaging actor is alert and relaxed in the moment of performance. Preparation for this optimal performance state may occur through a sequence of movement qualities, vibratory, pendular, abrupt, and sustained, in a technique called the body electric. To access this experience, before and after each participant engaged in one of four movement qualities sequences, the subject completed two assessments: (1) The Brief Mood Indicator scale evaluated mood and (2) Vital signs, including blood pressure, heart rate, temperature, and respiration, indicated arousal. The alert and relaxed state known as presence creates a heightened state of awareness through which performers create a dynamic relationship between the performer, the other performers onstage, and the audience.

1. Introduction

Presence in acting occurs when the actor is deeply connected to other characters, the audience, and the environment. When an actor is intuitively inspired in a moment on stage, the actor's experience is qualitatively different from consciously playing tactics on another actor or the audience to reach a goal. Similar to the high points in one's life, like falling in love, the bond between two people who are in this state of presence is charged and alive. In *Presence: How to Use Positive Energy for Success in Every Situation*, Rodenburg (2007) defined "presence" as energy that the actor sends to and receives from a specific object or person. Goodall (2008), an experimental performance writer, considered presence to be compelling and enigmatic charisma in live performance. As the actor savors each moment in such a state, s/he shares memorized text as if speaking it for the first time. Presence is the opposite of stage fright. As the actor transforms into the character, letting go of personal agency may elicit fear that blocks energetic flow. The actor may forget his or her lines, freeze like the proverbial deer in the headlights, or tremble uncontrollably with stage fright. Wilhelm Reich coined the term "character armor" as a chronic fear that locks the body into patterns of structural tension to "protect against the stimuli from the outer world" (Reich, 1949, p. 389). This trembling or freezing as a result of this fear is, according to voice teacher Michael Morgan, involuntary (Morgan, 2008). As an actor taking class with Broadway actress Betty Buckley, Preeshl learned that stage fright could be transformed into a "heightened state of awareness" (Betty Buckley, personal communication, September 13, 1999). Most actors fear stage fright and seek presence. To better understand, and possibly even invoke, the state of presence, this study proposed a method to test a path to presence through a sequence of movement qualities.

Legendary acting teacher and director Constantin Stanislavski offered a seminal example of presence in acting in his book, *Building a Character,* in which theatre student Kostya transformed from an acting student into the character of the critic as he applied makeup and donned his costume in his dressing room. Kostya looked at himself in the mirror, and recalled, "I rubbed … And went on rubbing [makeup] on my face … I trembled … my heart pounded … I powdered myself at random … [and] smeared [make-up] … straightened my coast and gave a tug to my cravat … with a quick, sure touch" (Stanislavski, 2008, p. 16). The flow of Kostya's actions invoked the electromyographic signatures measured by Wilson (1981): abrupt, pendular, sustained, and vibratory. Wilson neither placed the electromyographic signatures in a particular order nor applied the electromyographic signatures to acting. Instead, Wilson paired the four movement qualities on two continua: pendular-vibratory and sustained-abrupt. However, in the sequence of movement qualities followed by Kostya, Artemis Preeshl observed that a consecutive sequence of Wilson's four electromyographic signatures emerged. Kostya's progression from stillness to pendular to sustained to vibratory to abrupt gave rise to a sequence of movement qualities hypothesized to achieve presence in Preeshl's body electric technique.

To inhabit the character's mind, body, and heart, the actor moves beyond self-conscious control to instinctual awareness of actors and the audience in the moment. Thus, a seemingly paradoxical heightened state of relaxed alertness may be optimal for performance. This study intended to determine if subjects were able to obtain the optimal alert and relaxed state of presence through a particular sequence of movement qualities in the body electric technique. Developed by Artemis Preeshl, the body electric technique is designed to harness naturally occurring physiological processes tailored to transform the actor into a state of presence during two phases of the acting warm-up: the reflexive stage and the communicative stage. The reflexive phase releases tension and activates the body's reflexes. The reflexive phase consists of two qualities: pendular and vibratory. The vibratory quality occurs in conscious actions or subconscious reactions. When shivering from fear, cold, rage, or fatigue, involuntary trembling may occur. In contrast, a voluntary shaking occurs, such as shaking one's fist at another driver. The opposite of vibratory quality is the pendular quality characterized by a swinging motion which occurs as a relaxed limb vacillates in response to gravity. In the body electric technique, the reflexive stage of pendular and vibratory movement qualities allows the actor to transform into the desired character. The communicative phase creates a bridge between the character, other characters, and the audience through keen awareness in the immediate environment. The communicative phase is divided into two qualities: abrupt and sustained. By incorporating the dramatic elements of suspense and surprise, the actor speaks and moves expressively to attain the desired effect. Abrupt is an unexpected

or surprising movement. When the host of a party exclaims "Surprise!" the guest may involuntarily jump with astonishment. The host consciously uses shock to astound the guest. In contrast, sustained is continuous, unaccented movement. Skating on smooth ice, brushing someone's hair, or petting a compliant cat or dog exemplify this ongoing motion. According to the body electric construct, whereas vibratory and pendular qualities free the actor from habitual behavior, the abrupt and sustained qualities connect the actor to other actors and the audience. Through the body electric, the actor synthesizes intellect and instinct in character from moment to moment. To test this phenomenon, this study correlated physiological markers of heightened response (heart rate, blood pressure, respiration rate, and temperature) and mood with the sequence of movement qualities to approximate the alert, relaxed emotional state. How does this specific sequence of movement qualities from pendular to vibratory to sustained to abrupt affect the emotional and physiological states of the actor?

The body electric technique is grounded in the well-established theory of dance theorist Rudolf Laban. Laban (1950) postulated that how one habitually carries oneself and performs gestures creates character. Like markings that guide the interpretation of a musical score, Laban defined the eight Effort movement qualities to describe how one moves: Direct–Indirect, Light–Strong, Sudden–Sustained, and Bound–Free. While Wilson's (1981) theory recorded electromyographic signatures of four movement qualities paired on two continua: pendular-sustained and vibratory-abrupt, Laban's Effort movement qualities contained eight movement qualities (Direct–Indirect, Strong–Light, Sudden–Sustained, Bound–Free). The primary difference between Wilson and Laban's work is intentionality. The electromyographic signatures in Wilson's theory revealed what muscles naturally do. In contrast, because Laban observed actions that workers performed to optimize efficiency and safety of workers and athletes, he created a system of observing actions. Whereas Wilson's electromyographic signatures of the four movement qualities were based on involuntary responses, Laban's Effort qualities were intended to document intentional actions.

The body electric technique fuses instinctual reflex and intentional action. The reflexive stage of the body electric technique consists of one quality that only Wilson observed, pendular, and another quality that both Wilson and Laban observed, vibratory. Although the pendular quality may start intentionally, when a person lifts his or her arm, unless s/he chooses to hold his or her arm up, his or her arm falls in a response to gravity. Therefore, the pendular quality can be either voluntary or involuntary. Laban excluded the movement quality of pendular from his eight Effort qualities. Similarly, the vibratory state is both voluntary and involuntary. As a physiological response to hunger or cold, for example, trembling occurs. Although Laban notated the vibratory quality as extreme Bound flow, or high tension, the intention of the person is not taken into account. S/he may try to stop the trembling; however, if the trembling has a physiological base, s/he may or may not be able to stop or control the vibration. Thus, Laban's notation of Effort movement qualities did not distinguish between voluntary or involuntary vibration. In the body electric technique, the vibratory quality may be relaxed or tense, voluntary or involuntary. Therefore, the amount of tension in the vibratory quality depends physiological response, individual reaction, and personal habits.

In the body electric technique, whereas the reflexive stage tends to be involuntary, the communicative stage is more likely to be voluntary. Consequently, the communicative stage of sustained and abrupt qualities is markedly similar to Laban's Effort qualities. Sustained is continuous and ongoing; abrupt is sudden and unexpected. Although, the abrupt and sustained qualities may be intentional or involuntary in the body electric technique, it is more likely that pendular and vibratory will be involuntary and Sustainment and Suddenness will be voluntary. The body electric technique differs from Wilson and Laban's theories because of the sequencing of essential involuntary and voluntary movement qualities for actor training. If a sequence of movement qualities encouraged an actor to transform into character, then the body electric technique would pave a path to presence. Therefore, it was hypothesized that the progression from the reflexive State of pendular and vibratory to communicative State of sustained and abrupt qualities would induce the optimal performance state of presence, and that distinct physiological changes in heart rate, temperature, respiration rate and blood pressure, and mood would measure the achievement of this alert, relaxed state.

2. Literature review

Two related studies have previously been conducted to observe movement qualities in specific tasks and measure physiological responses to the vibratory quality. In "Personality and Movement Style" (Preeshl, 1984), forty subjects were observed as they performed tasks designed to elicit combinations of Laban's movement qualities such as brushing a crumb (light, indirect, and free) or pounding a nail (strong, sudden, and direct). Laban movement qualities were correlated with Carl Jung's personality traits on the Myers Briggs Type Indicator: Extrovert/Introvert, Sensing/Intuiting, Thinking/Feeling and Judging/Perceiving. Statistical results were mildly significant, indicating a correlation between Extroversion/Introversion, and the Bound–Free and Direct–Indirect continua. This observational study based in psychophysical research sparked further inquiry into body language. In a pilot study conducted by Preeshl and George (2010), "Vibratory quality and Emotional State," five subjects were encouraged to induce involuntary vibration for twenty minutes. Before and after the physical session, heart and blood pressure measured physiological changes, and the Brief Mood Introspection Scale (BMIS) measured emotional response. Heart rate and blood pressure showed a tendency to increase in the 20-minute session. Pretest/Posttest results of the BMIS indicated that emotions varied significantly after involuntary vibration. Building on these two previous studies, to determine the effects of a sequence of movement qualities on presence, measured by physiological markers and BMIS, the current study examined the effects of how the body electric sequence impacted subjects emotionally and physiologically. The body electric technique study proposed to activate involuntary and voluntary systems to lead a subject from introspective reflexivity to interactive engagement. Through the suggested movement qualities of the body electric technique, the "how" of movement qualities might provide a key to "how" an actor becomes a character.

Numerous exercise science studies have suggested the beneficial effects of exercise on mood (Berger & Motl, 2001; Weinstein, Deuster, Francis, Beadling, & Kop, 2010). Steinberg et al. (1998) reported that most single exercise session with pre- and post-psychological assessments trend toward positive affect. Yeung (1996) found that single bout aerobic/non-aerobic exercise with control groups published from 1976 to 1995 indicated reduced anxiety on the State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970) and reduced negative moods and increased vigor-activity on the Profile of Mood States (POMS) (McNair, Lorr, & Droppleman, 1971). Having surveyed literature on mood and exercise, Berger and Motl (2001) found that mood changes occurred through exercise in normal and clinical populations. Although exercise tended to enhance mood in single-session and longitudinal designs, further experimentation would be required to establish causality.

Although it is recognized that diverse methodological designs make comparison among studies challenging, the length of the single session is supported by the 10-minute walking study by Thayer (1989) as well as the 10-, 20-, and 30-minute ergometric bicycle study by Nair, Kastin, and Schally (1971), in which both found a favorable impact on mood on the POMS inventory after the 10-minute session. The POMS is the other primary metric used to assess mood (Hseih, 2013). McNair et al. (1971) developed this self-report assessment tool that contained 65 items on a five-point Likert scale from 0 (not at all) to 4 (extremely). The POMS has a slightly lower Cronbach α consistency rating (0.63–0.96). BMIS has a higher consistency than POMS. POMS has a lower rating on internal consistency. For that reason, Preeshl and Goerge selected the BMIS for this study.

Weinstein et al. (2010) noted that self-selection of exercise intensity is associated with the greatest improvements in mood. Gailliot (2007) suggested that the high-energy state of arousal should improve self-control. While Zajonc (1965) found that arousal heightened automatic responses, extreme sensitivity to the environment or intrapersonal stressors may impede performance. Yet, too much arousal could negatively impact performance. As a result of psychosocial stressors, Johansson, Hassmén, and Jouper (2008) found that those who exercised regularly exhibited lower stress, better concentration, and more intrinsic motivation than those who exhibited more stress. To counterbalance excess excitation, relaxation may quiet the body–mind to allow for successful recitation of text in a public setting. Streeter et al. (2010) found that yoga tended to increase parasympathetic nervous system activity. Because of the impact of mood on performance, activation of the relaxation response may allow for presence.

3. Methodology

3.1. Participants

The self-selected participants were 47 undergraduate and 2 graduate students (25 women, 24 men); ages range from 18 to 27 years old with a mix of ethnicities at a small, urban university in the South. Twenty-five participants were theatre majors; 24 participants were non-theatre majors. Major was determined by self-report and confirmed in the university database. Twenty percent were freshmen; 29% were sophomores; 27% were juniors; 20% were seniors; 4% were graduate students. In the Institutional Board of Review (IRB) research protocol, researchers disclosed risks and the University IRB approved the protocol. All volunteers were recruited through posted advertisements on the campus. Written informed consent forms included information about access to health services. All participants signed the informed consent forms. Subjects were not compensated for participation. However, five subjects requested credit toward partial fulfillment of a psychology course requirement for participation upon completion of the study. Because none of the researchers taught psychology courses, the subjects were not coerced to participate in the study. Due to the intimate nature of the university and the close relationships frequently developed between instructors and students, lack of compensation was not considered a detriment to the recruitment of participants.

3.2. Measures

When subjects arrived at the testing room, a certified family nurse practitioner screened the subjects. The family nurse practitioner held a master's degree in Nursing and had passed the state certification exam. To facilitate analysis, blood pressure was subdivided into diastolic and systolic measures; body temperature was measured in degrees Fahrenheit; heartbeats per minute determined pulse rate; respiration rate was operationalized as breaths per minute. Upon completion of vital signs testing, subjects were asked to pass through four stages for two and a half minutes per movement quality; for a total of ten minutes. Prior to and immediately after the movement protocols, subjects completed the BMIS to determine state.

3.3. Questionnaire

In a repeated-measure design, the BMIS test (Mayer & Gaschke, 1988) was administered pre-task to establish a baseline and post-task to access potential changes (see Appendix A for BMIS). The BMIS is one of the most frequently used measures of mood in psychological studies. Participants indicated how well each adjective or phrase described their present mood on a 16-item, 4-point intensity scale which ranged from (1) Definitely Do Not Feel to (2) Do Not Feel to (3) Slightly Feel to (4) Definitely Feel. This measure has been shown to have good internal reliability (Cronbach's α −.76 to .83). Researchers have maintained that the pleasant–unpleasant and arousal–calm dimensions of mood are central to cognition and understanding multi-system personality domains (Mayer, 1986). Therefore, due to the fact that the purpose of the research was to determine if subjects were able to obtain the prescribed alert, relaxed state believed to be most conducive to theatre performance, the BMIS aroused–calm mood dimension was an important indicator measure of this desired state. However, given the association of positive mood as a result of exercise, this study assessed all four subscales from the BMIS: Arousal–Calm, Positive–Tired, Negative–Relaxed and Pleasant–Unpleasant. High scores represent positive moods and low scores represent negative moods (Minimum value = 16; Maximum value = 64). High arousal is typically associated with positive mood and low arousal is associated with negative mood. It was hypothesized that Protocol A, vibratory-pendular-abrupt-sustained, led to alert and relaxed performance observed by changes in vital signs, such as lowered heart rate, elevated blood pressure, and high scores on Arousal-Calm and Positive-Tired, Negative-Relaxed and Pleasant-Unpleasant.

3.4. Procedure

A quasi-experimental design included a repeated emotional and physiological measure administered before and after a single 10-minute bout of individual, unsupervised improvization on one of four protocol sequences of vibratory, pendular, sustained, and abrupt movement qualities. During the single-bout 10-minute session, each participant was instructed to improvise on a new movement quality prompt in each 2.5-minute interval. The order of the movement quality prompts (vibratory, pendular, sustained and abrupt) was based on the four randomly assigned protocols. The methodological design

focused on the participants' physiological and emotional response to the sequence of four 2.5-minute movement quality prompts. The movement qualities were new to all participants.

The participants were assigned to one of four different protocols of the movement qualities on a first come, first serve basis. When a participant called or emailed for an appointment, the participant was given the next available protocol for their gender, whether or not the participant was a theatre or non-theatre major. For example, if the first female participant who was a theatre major was assigned Protocol A, the next female theatre major was assigned Protocol B. The physiological and mood pre- and post-measures were included to account for variability in mood and physiological response to varied sequences of the following movement qualities: vibratory, pendular, sustained and abrupt. The four protocols to which subjects were assigned varied according to the order of the following movement qualities: vibratory-pendular and abrupt-sustained. For example, the sequence of Protocol A consisted of vibratory-pendular and abrupt-sustained qualities, while the sequence of Protocol B consisted of pendular-vibratory and abrupt-sustained qualities. All possible combinations of sequences of vibratory-pendular and abrupt-sustained qualities were used in testing subjects. The characteristics of the four different Protocol sequences are provided in Table 1.

Once the participants had completed the measurement of vital signs (heart rate and blood pressure) and the BMIS, they were provided with a sequence of four movement qualities, vibratory, pendular, sustained, and abrupt from the Protocol to which they were assigned. The four words intended to capture the vibratory, pendular, sustained, and abrupt characteristics necessary in the body electric technique. After the subjects received their protocol of a sequence of four movement qualities, they were led to an adjoining room and instructed to act out the first assigned movement quality for two and one half minutes. In 2.5-minute phases, the principal researcher verbally cued the participant to change to the next movement quality in their assigned protocol. Depending upon the specific movement quality given, the acting improvisation could entail more or less mental rehearsal and physical activity. Upon completion of the Protocol of four movement qualities, subjects were again measured on their vital signs and their mood as measured by the BMIS in a post-test situation. According to the established BMIS, measures of subjects' mood were taken on emotional states such as "Active," "Tired," "Content," and "Gloomy." The dimensions of the BMIS mood are provided in Table 2.

Table 1. Dimensions of Protocols

Protocol A	Protocol B	Protocol C	Protocol D
Vibratory-pendular	Pendular-vibratory	Vibratory-pendular	Pendular-vibratory
Abrupt-sustained	Abrupt-sustained	Sustained-abrupt	Sustained-abrupt

Table 2. The proportion of variance explained by the retained factors

Variable	Value	% Variance explained
Active	0.691	69.1
Caring	0.875	87.5
Fed up	0.584	58.4
Gloomy	0.767	76.7
Jittery	0.752	75.2
Lively	0.61	61
Loving	0.883	88.3
Nervous	0.706	70.6
Peppy	0.54	54
Sad	0.815	81.5
Calm	0.698	69.8
Tired	0.692	69.2

4. Results

Subjects included 47 undergraduate students; 48.9% male, 51.1% female, of varying college majors. The majority of participants were recruited from the College of Music & Fine Arts with 48.9% studying Theatre, 2.1% Music, 6.4% Music Therapy, 4.2% Music Performance, and 2.1% Music Industry Studies. The remaining subjects had majors of Psychology (10.6%), History (8.5%), English (2.1%), Communication (2.1%), Biology (6.4%), Philosophy (2.1%), Journalism (2.1%), and Nursing (2.1%).

Subjects were initially measured on a series of vital signs including body temperature, blood pressure, respiration, and pulse rate. According to the US Department of Health & Human Statistics (2015), normal adult blood pressure is under 120 systolic and less than 80 diastolic (www.nhlbi.nih.gov) (National Heart, Lung, and Blood Institute, 2015). Based upon the findings, the blood pressure of the subjects in this study did not differ significantly from the normal range. Compared to women in the same age group, men under 45 tend to have higher and less well-controlled blood pressure (www.nhlbi.nih.gov). The tendency may explain results in Table 3.

4.1. Gender differences

In *t*-tests conducted to determine if any significant post-test changes occurred in blood pressure, sex of subject was found to have a statistically significant outcome on systolic pressure. No significant changes were found in diastolic pressure. *t*-test results indicated a significance level of 0.007, with $\alpha = .05$, in tests of sex and post-test systolic blood pressure. Levene's Test indicated a value of .661 with a significance = .421. Results greater than 0.05 indicate variability between the two groups, male and female, are nearly equal or at least not statistically significantly different. This is believed to bode well for the study as the significant difference in systolic pressure by gender can achieve more veracity.

A multivariate analysis of variance (MANOVA) was conducted as a "step down," or post hoc analysis. The MANOVA indicated no statistically significant results to be found in analyses of Protocol and vital signs. The BMIS protocol sequence given to subjects had no statistically significant effect on post-test measures of systolic blood pressure, diastolic blood pressure, respiration rate, body temperature, or pulse rate. The Hotelling–Trace coefficient, also known as Lawley–Hotelling, that tested for multivariate mean differences between the two groups, male and female, were not found to be statistically significant.

The coefficient of determination, R^2, indicating the amount of variance in the dependent variable explained by manipulation of the independent variable, were all found to be 0.00. This indicates that 0% of the variance in vital signs was explained by gender or the movement protocols given to subjects.

A MANOVA conducted on sex by post-test pulse rate was the only test to elicit a significant result. The test for sex and post-test systolic blood pressure was found to be statistically significant at the $\alpha = .05$ level. However, despite the significance of the finding, the associated R^2 indicated only 15.2% of the variance in post-test systolic blood pressure was explained by the subject's sex. This fact brings with it some measure of concern due to the fact that such a result could be due to a confounding factor of which the researchers were unaware. Alternately, this finding could be attributed to a tendency that men under 45 have toward higher blood pressure and less well-controlled blood pressure. Univariate MANOVA tests for the relationship of sex and vital signs can be found in Table 4.

Table 3. Cross tabulations of blood pressure by gender

	Pre-test blood pressure		Post-test blood pressure	
Gender	**Systolic**	**Diastolic**	**Systolic**	**Diastolic**
Male	116.783	72.087	127.174	74.261
Female	104.75	64.5	115.583	69.25

Table 4. MANOVA results in univariate tests of sex and vital signs

Variable	Vital sign	Sig.	R^2
Sex	Body temperature	0.594	0.006
Sex	Pulse rate	0.249	0.029
Sex	Respiration rate	0.174	0.041
Sex	Systolic blood pressure	0.007	0.152
Sex	Diastolic blood pressure	0.093	0.062

Table 5. MANOVA univariate tests of Protocol and Calm-Relaxed BMIS state

Univariate test	Value	Sig.	η^2
Pillai's trace	0.618	0.829	0.047
Wilks' lambda	0.908	0.64	0.047
Hotelling's trace	0.101	0.644	0.048
Roy's largest root	0.094	0.263	0.086

MANOVA tests indicated that the sequence of movement qualities in a specific protocol given to subjects had no statistically significant effects on the ability to achieve an alert and relaxed state believed to be highly conducive to optimal theatre performance. Therefore, Protocol was not found to have had any significant effects on subjects' post-test measure of mood. Values of η^2 can be defined as the proportion of variance associated with or accounted for by each of the main effects (Tabachnick & Fidell, 2011; Thompson, 2006). The various univariate MANOVA test results can be seen in Table 5.

In a MANOVA conducted with MAJOR and the BMIS Negative-Relaxed Mood Dimension, $F = 2.194$, sig. = .033, partial $\eta^2 = .456$ for the relationship of reverse coded post-treatment "tired" score for subjects and major in a secondary post hoc, univariate ANOVA tests conducted automatically by the software. η^2 can be defined as the proportion of variance associated with, or accounted for, by each of the main effects, interactions, and errors in an ANOVA (Tabachnick & Fidell, 2001). The η^2 of .456 is giving us 45.6% of the variance in mood dimension score being explained by a student's major. Since "Tired" negatively correlated with MAJOR, and "Tired" may be considered as the opposite of arousal, a negative correlation of tired could infer arousal, or alertness, in a way that could contribute to the state of presence. This finding could indicate a need for further research.

4.2. Factor analysis

In accord with the previous research of Watson and Tellegen (1985) using the BMIS in their study of mood, principal-axis factor analysis was utilized in this study. Some caveat is in order before the results of this test are discussed. Factor analysis is a technique that requires a large sample size. Factor analysis is based on the correlation matrix of the variables involved, and correlations usually need a large sample size before they stabilize. Tabachnick and Fidell (2001) and Comrey and Lee (1992) advise sample sizes of at least 100 before a factor analytic technique is viable. While it is notable that in exercise studies, sample sizes typically range from 11 to 80 participants (Hansen, Stevens, & Coast, 2001; Johansson et al., 2008; Silvia, Phillips, Baumgaertner, & Maschauer 2006; Streeter et al., 2010; Weinstein et al., 2010), the factor analysis utilized in this research can best be described as exploratory due to the small sample measured.

With that caveat in mind, factor analysis using the various components of the aroused-calm BMIS dimension indicated that four factors were retained after a Principal-Component Analysis Extraction method using Varimax Rotation with Kaiser Normalization. The Kaiser-Meyer-Olkin Measure

of Sampling Adequacy provided a value of 0.632. This measure varies between 0 and 1, with values closer to 1 considered superior. A value of 0.6 is a suggested minimum. Bartlett's Test of Sphericity obtained a value of 227.781, with a significance of 0.0 using a Varimax Rotation with Kaiser Normalization. Based upon the Bartlett's value, the null hypothesis was rejected. Taken together, these two tests provide a minimum standard, which should be achieved before a factor analysis, or a principal components analysis, should be conducted (Comrey & Lee, 1992).

The communalities associated with the components of the factor analysis indicated the amount of variance that was accounted for by the extracted factors. It was noted that 69.1% of the variance in the component Active was explained by the retained factors. Variables with higher values are considered well represented in the common factor space, while variables with lower values are not well represented (University of California Los Angeles Academic Technology Services, 2015). The remaining variances for the components of the mood scale are reported in Table 2.

4.3. Principal-Component Analysis Extraction method

For the total variance explained, three components stood out. Component 1 accounted for 26.291% of the total variance in the factors. Component 2 accounted for 19.324% and Component 3 accounted for 17.080% of the total variance. Overall, four primary factors were retained in the factor analysis. Loadings indicated five variables loading under Factor 1, three variables loading under Factor 2, two variables loading with Factor 3, and two variables loading with Factor 4. Table 6 provides a Rotated Component Matrix. Only those loadings considered "high" are reported. High loadings were operationalized as any in excess of 0.50 (Comrey & Lee, 1992).

4.4. Negative binomial regression

In an effort to predict if subjects would be able to achieve the desired alert and relaxed state based on the protocol they were assigned, a negative binomial regression was performed using Stata. Results indicated no statistically significant relationships at the $\alpha = .05$ level. It is believed that the small sample size could be responsible for the lack of significance.

Three statistically significant results were found; however, reasons other than the effect of the sequence of movement qualities on physiological and/or emotional arousal may have influenced these significant correlations. First, the subjects correlated significantly with the BMIS state, "Tired" and the subject's MAJOR negatively correlated with the BMIS Negative-Relaxed Mood Dimension. Second, the systolic blood pressure of male subjects increased across protocols. The following discussion addresses the significance of the interaction of the variables of MAJOR and mood as well as gender with systolic blood pressure.

Table 6. Rotated component matrix

	1	2	3	4
Jittery	0.825			
Nervous	0.771			
Peppy	0.702			
Active	0.656			
Calm	0.526			
Gloomy		0.868		
Sad		0.858		
Fed up		0.759		
Loving			0.93	
Caring			0.925	
Tired				0.774
Lively				0.534

5. Discussion

The hypothesis that the Protocol 1 (vibratory, pendular, sustained, and abrupt) increased the alert, relaxed state of Presence empirically indicated by physiological measures (heart rate, blood pressure, respiration rate, and temperature) and Arousal was rejected. These physiological markers did not differ significantly according to which protocol that participants were assigned.

Systolic blood pressure did increase for men across protocols. Findings on the relationships between blood pressure and gender yielded mixed results in other studies. Ewart and Kolodner (1994) found that negative traits such as depression and anger predicted prevailing blood pressure levels during daily activity in black and white adolescents. In this study, the factors of gender, social setting (in classroom vs. with friends), and nonverbal expressive style "moderated" this association of blood pressure with personality traits (p. 596). Subsequently, Räikkönen, Matthews, Flory, Owens, and Gump (1999) found that trait anxiety and pessimism contributed to higher blood pressure across gender. Previously, Schwartz, Warren, and Pickering (1994) had found that positive and negative mood contributed to differences in ambulatory blood pressure. One of the strengths of the study of Räikkönen et al. (1999) was a match between the level of occupational prestige of middle-aged men and women in their study. However, Räikkönen et al. (1999) reported that they had not found other studies that correlated the effects of trait anxiety on ambulatory blood pressure. However, Johansson et al. (2008) did not find a gender difference between mood and anxiety in response to Qigong exercise. Since men under 45 men show a tendency for higher blood pressure than women, this correlation between gender and systolic blood pressure would benefit from further study.

The Positive-Tired, Negative-Relaxed, and Pleasant-Unpleasant scales neither increased nor decreased significantly as a result of the movement quality protocols. However, a significant relationship was found between the major of the participant and the BMIS state, "Tired." The MANOVA conducted with MAJOR and the BMIS Negative-Relaxed Mood Dimension also produced a significant correlation between subjects and major in a secondary post hoc, univariate ANOVA tests. With the η^2 of .456, 45.6% of the variance in mood dimension score on the variable "Tired" was explained by a student's major.

It was anticipated that theatre majors would become more alert and relaxed in response to the Protocol "A" movement quality sequence. In theatre classes, majors warm up their bodies and voices through acting exercises. Because of this acclimation to physical and vocal exercises, it seemed likely that theatre majors would demonstrate higher positive correlations to achieve the alert and relaxed state of presence. However, theatre is an interactive activity. Because each participant experienced the protocols without other participants in the room, perhaps the lack of interaction could account for the interaction with the BMIS state, "Tired."

Another possible explanation for the theatre majors to report the feeling of "Tired" could relate to activity level. In this study, the participants chose the level of intensity in the protocols. As noted in the literature review, Weinstein et al. (2010) found that self-selection of exercise intensity is associated with the greatest improvements in mood. Therefore, the participant's choice of a high or low level of intensity may have influenced the report of "Tired" on the BMIS. Because theatre students might have more stamina from theatre training compared with participants from other majors, the theatre majors might have been expected to have a higher correlation with the BMIS state, "Tired." Furthermore, because "Tired" could indicate mental and/or physical energy, the provocative relationship between MAJOR and "Tired" could suggest that participation in the protocols influenced some of the participants to report feeling "Tired." To better assess the relationship between movement protocols and the BMIS moods of Arousal, and Tired among students from different majors, more research on the impact of voluntary and involuntary movement on mood, especially on the alert state, could further explore the relationship between movement and the optimal performance state.

6. Conclusion

The results revealed significant gender differences in systolic blood pressure and a negative correlation between the "Tired" BMIS mood and MAJOR. To the extent that Arousal correlated with a positive mood, "Tired" as mental or physical fatigue could have affected the correlation between "Tired" and MAJOR. These two significant findings suggested a correlation between mood and MAJOR as well as systolic blood pressure and gender, respectively.

The intensity of the exercise could be a relevant factor in the findings of this study. Solomon and Corbit (1973) found that positive affective was experienced following stressful activity. Contrariwise, Steptoe and Bolton (1988) and Steptoe and Cox (1988) measured mood immediately following exercise. Whereas high-intensity exercise resulted in negative mood, lower intensity exercise resulted in positive mood. The association of the mood state "Tired" with MAJOR could be important because arousal tends to correlate with positive affect (Corson & Verrier, 2007; Dolcos, LaBar, & Cabeza, 2004; Gayle, 1997; Gorn, Pham, & Sin, 2001). The lack of supervision during the movement quality protocols, which allowed for the individual's choice of intensity of exercise, may have influenced the report of "Tired."

The association of "Tired" with MAJOR could suggest further study on the impact of MAJOR on mood. Consider two studies on attention. Mather (2007) and Mendl (1999) indicated that increased attention led to the heightened possibility of survival. Brunyé, Mahoney, Augustyn, and Taylor (2009) found that high arousal could increase the ability to accurately retrieve global information. However, since Westermann, Spies, Stahl, and Hesse (1996) found that negative mood induction procedures have larger effects than positive mood inductions, the significant correlation between the negative mood, "Tired," and MAJOR might have been anticipated without implying causation (Nguyen, 2008).

The lack of significant differences between protocols on post-inducement positive and negative mood scores could suggest an alternate configuration of states. For example, the finding of Fredrickson and Levenson (1998) suggested that contentment enhanced appreciation for the present moment and one's place in the world; contentment has been shown to shorten the duration of cardiovascular arousal produced by negative emotions. Hence, the combination of the BMIS moods of Calm, Lively, Peppy and Active with Content in the scoring might approximate relaxed alertness that tends to characterize the optimal performance state.

To consider the effects of personality traits and moods in women and men, a follow-up study that compared responses of participants on the Spielberger Trait Anxiety Inventory and the Brief Mood Inventory Scale might indicated a distinction between the effects of positive and negative personality traits and moods on blood pressure in women and men. Alternately, an experimental study could sample movement qualities longitudinally in conjunction with the POMS (Lorr, Douglas, & Droppleman, 2004) to assess change as a result of treatment through the protocols over time. Because the present study showed a significant correlation between mood and MAJOR, and blood pressure with gender, to improve the methodology in a future study on movement qualities, mood, and physiological changes, utilization of a control group or wait list, randomization of subjects, observation of movement qualities, and a blinded outcome assessment would enhance the experimental reliability.

In conclusion, further research could elucidate how "Tired" related to arousal to approximate a heightened state of awareness. Since "Tired" negatively correlated with MAJOR, and "Tired" might be considered as the opposite of alertness, this negative correlation between "Tired" and MAJOR merits further study. Moreover, to better assess the relationship between "Tired" and MAJOR, a study to compare performance students and non-performance students in an observed sequence of pendular, vibratory sustained, and abrupt movement qualities in a double-blind experiment with a control group might enhance reliability. The observation of the movement qualities could yield significant information about the change from the reflexive stage to the communicative stage. Furthermore, the POMS could be substituted for the BMIS to test for correlations between observed movement qualities and

the alert and relaxed state. The new hypothesis is that observation of body electric movement quality protocols measured in motion may correlate with mood to achieve high arousal and relaxation. This further research on the transition from preparation in the reflexive stage to interactive engagement in the communicative stage could lead to a better understanding of presence in performance.

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Appendix A

Brief Mood Introspection Scale (BMIS)

by John D. Mayer

Instructions: Circle the response on the scale below that indicates how well each adjective or phrase describes your present mood.

(definitely do not feel)	(do not feel)	(slightly feel)	(definitely feel)
XX	X	V	VV
Lively	XX X V VV	Drowsy	XX X V VV
Happy	XX X V VV	Grouchy	XX X V VV
Sad	XX X V VV	Peppy	XX X V VV
Tired	XX X V VV	Nervous	XX X V VV
Caring	XX X V VV	Calm	XX X V VV
Content	XX X V VV	Loving	XX X V VV
Gloomy	XX X V VV	Fed up	XX X V VV
Jittery	XX X V VV	Active	XX X V VV

Overall, my mood is:

Very Unpleasant Very Pleasant

-10–9–8–7–6–5–4–3–2–1 0 1 2 3 4 5 6 7 8 9 10

Please Note: The "Overall, my mood is" section is usually omitted, although some people use it and fold it into the overall score.

Original citation: Mayer and Gaschke (1988) [Scoring instructions are described there]

Some other articles that have used the scale:*

- Kokkonen and Pulkkinen (2001).
- Halberstadt, Niedenthal, and Kushner (1995).
- Hall and Baum (1995).
- Mayer, Allen, and Beauregard (1995).
- Mayer and Hanson (1995).

*The scale has been used in many other articles; I do not have a comprehensive list at this time. If you know of other uses, I would be delighted to hear of them.